Spot Safety Project Evaluation

Project Log # 200505105

Spot Safety Project # 13-00-205

Spot Safety Project Evaluation of the Actuated Flashing Traffic Signal Installation at the Intersection of SR 3495 – Glen Bridge Rd and SR 3553–New Rockwood Rd / SR 3527-Bradley Branch Rd in Buncombe County.

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation

Principal Investigator

_____ 09/15/2005
Majed Bazzari Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 13-00-205 – The Intersection of SR 3495-Glen Bridge Rd and SR 3553-New Rockwood Rd / SR 3527-Bradley Branch Rd in Buncombe County.

Introduction

In an attempt to assess the safety of our roads, the Safety Evaluation Group of the Traffic Safety Systems Management Section has evaluated the above project. The methodologies used in this evaluation offer various philosophies and ideas, in an effort to provide objective countermeasure crash reduction results. A naive before and after analysis of the treatment versus comparison data has been completed to measure the effectiveness of the spot safety improvement. This information is provided to you so the benefit or lack of benefit for this type of project can be recognized and utilized for future projects.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of an actuated flashing traffic signal. SR 3495-Glen Bridge Rd is a two-lane facility with no left turn lanes at the intersection with SR 3553-New Rockwood Rd / SR 3527-Bradley Branch Rd. Both SR 3553-New Rockwood Rd and SR 3527-Bradley Branch Rd are two-lane facilities with no left turn lanes. SR 3495 has a speed limit of 35 mph while Both SR 3553 and SR 3527 have speed limits of 45 mph. The intersection is controlled by stop signs on both SR 3553 and SR 3527. The original problem statement was angle crashes occurring at the intersection due to restricted sight distance by the vehicles entering SR 3495.

The initial crash analysis for SR 3495 at SR 3553 / SR 3527 was completed from July 1, 1997 through December 31, 2000 with a total of 18 reported crashes. There were Nine Angle crashes, Five Left Turn crashes and Two Ran off Road crashes that, were deemed correctable by the flasher installation. There was One Fatality (Date: 5/7/2000), Three class A injuries, Three class B injuries and Eight class C injuries resulting from these crashes. The final completion date for the flashing traffic signal installation at the subject intersection was on October 15, 2001.

Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from September 1, 2001 through November 30, 2001. The before period consisted of reported crashes from May 1, 1998 through August 31, 2001 (3 years and 4 months) and the after period consisted of reported crashes from December 1, 2001 through March 31, 2005 (3 years and 4 months). The

ending date for this analysis was determined by the available crash data at the time the crash analysis was completed.

The analysis also consisted of two different sets of data, the treatment and the comparison data. The treatment data consisted of all crashes within 150 feet of the subject intersection. The comparison data consisted of all crashes within 150 feet of the intersection of SR 3495 - Glen Bridge Rd and SR 3522 - Old Shoal Rd. *(Please see attached location map for further details).*

The following data table depicts the Naive Before and After Analysis for the above information. Please note that Frontal Impact Crashes were the target crashes for the applied countermeasure. These crash types considered are as follows: Left turn, same roadway; Left turn, different roadways; Right turn, same roadway; Right turn, different roadways; Head on; and Angle.

Treatment Information			
	Before	**After**	**Percent Reduction (-) Percent Increase (+)**
Total crashes	15	18	20.0
Total Severity Index	13.6	4.7	-65.4
Frontal Impact Crashes	11	14	27.3
Frontal Severity Index	10.6	4.7	-55.6
Volume	5500	6200	12.7
Comparison Information			
	Before	**After**	**Percent Reduction (-) Percent Increase (+)**
Total crashes	11	15	36.4
Total Severity Index	24.4	4.5	-81.7
Frontal Impact Crashes	11	15	36.4
Frontal Severity Index	24.4	4.5	-81.7
Volume	7000	8200	17.1
Odds Ratio: Treatment versus Comparison			
	Before	**After**	**Percent Reduction (-) Percent Increase (+)**
Treatment Total Crashes	15	18	**-12.0**
Comparison Total Crashes	11	15	
Treatment F.I. Crashes	11	14	**-6.7**
Comparison F.I. Crashes	11	15	

The naive before and after analysis at the treatment location resulted in a 20.0 percent increase in Total Crashes, a 27.3 percent increase in Frontal Impact Crashes, a 65.4 percent decrease in the Total Severity Index, a 55.6 percent decrease in the Frontal Severity Index, and a 12.7 percent increase in Average Daily Traffic (ADT). The comparison locations resulted in a 36.4 percent increase in Total Crashes, a 36.4 percent increase in Frontal Impact Crashes, an 81.7 percent decrease in the Total Severity Index, an 81.7 percent decrease in the Frontal Severity Index, and a 17.1 percent increase in ADT. The before period ADT year was 1999 and the after period ADT year was 2003.

The Odds Ratio is used as another means of calculating the treatment effect. The total crashes in the before and after period from the Comparison intersections are used to calculate the percent reduction in total crashes for the Treatment Intersection. As shown in the table above, using the Odds Ratio calculation, there is a 12.0 percent decrease in Total Crashes and a 6.7 percent decrease in Frontal Impact Crashes at the treatment intersection.

Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 20.0 percent increase in Total Crashes and a 27.3 percent increase in Frontal Impact Crashes. Using the Odds Ratio to calculate the treatment effect resulted in a 12.0 percent decrease in Total Crashes and a 6.7 percent decrease in Frontal Impact Crashes. The summary results above demonstrate that the treatment location appears to have had an increase in both Total and Frontal Impact Crashes according to the comparison of the treatment before and after actual data while according to the odds ratio the treatment sight appears to have had a decrease in both the Total and Frontal Impact Crashes.

According to the crash reports and the field investigation for the treatment site there is still an existing sight distance problem. A further investigation into the sight distance issue may be needed. (*Please see attached photos*).

From the above crash statistics it can be seen that the main effect of the flasher was reducing the severity of the crashes from the before to the after period while the number of both Total and Frontal Impact Crashes from the before to the after period increased.

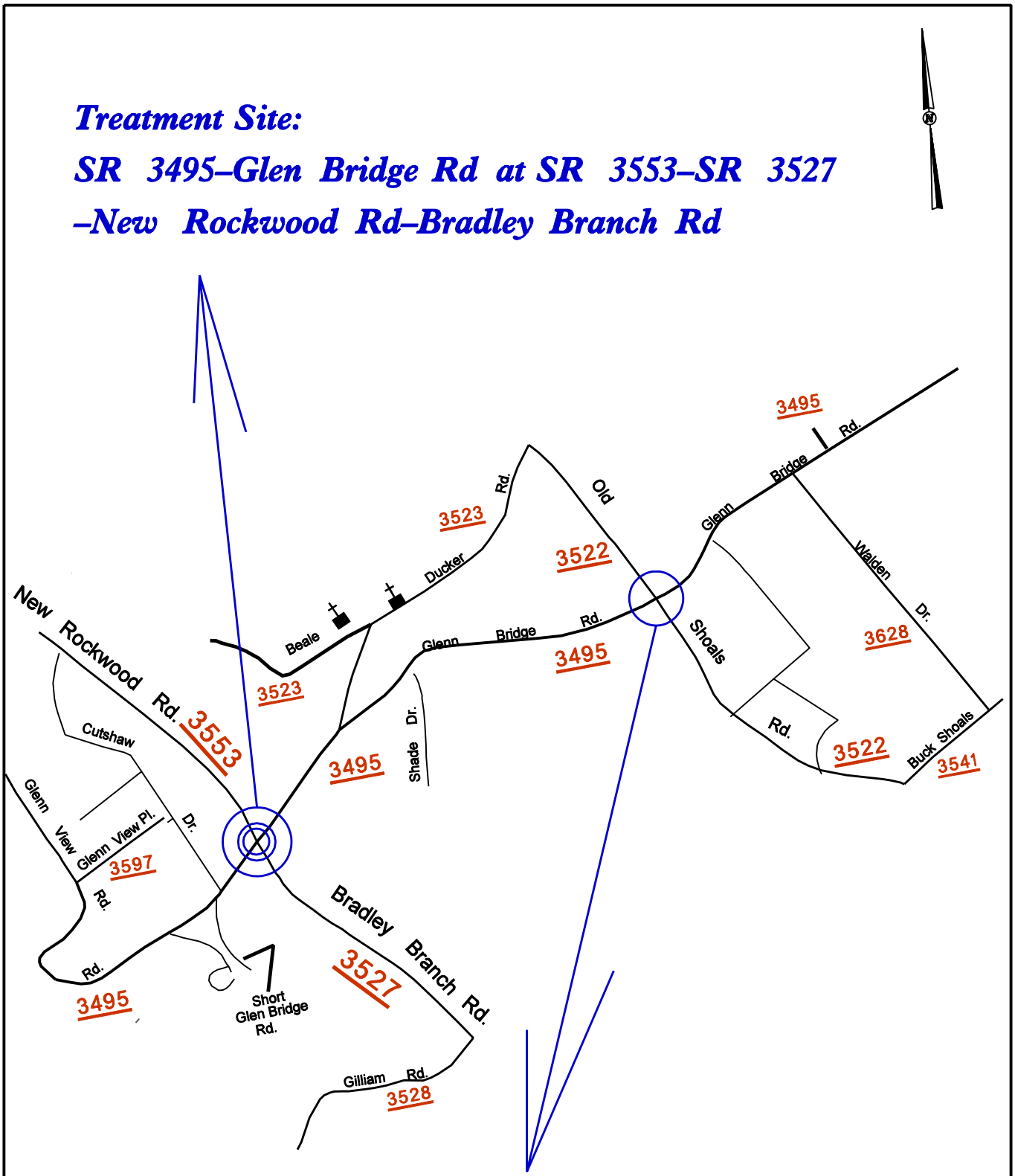
The countermeasure crash reduction for Total Crashes at the subject intersection can be in the range of 12 percent decrease to 20 percent increase in crashes. The countermeasure crash reduction for Frontal Impact Crashes at the subject intersection can be in the range of 6.7 percent decrease to 27.3 percent increase in crashes. As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of intersection.

Evaluation of Spot Safety Project Number 13–00–205

Location Map, Buncombe County

Treatment Site:

SR 3495–Glen Bridge Rd at SR 3553–SR 3527 –New Rockwood Rd–Bradley Branch Rd



Comparison Site:

SR 3495–Glen Bridge Rd at SR 3522–Old Shoals Rd

location map.dgn 11/15/2005 12:41:21 PM

Treatment Site Photos (Taken on July 28, 2005)

SR 3495 – Glen Bridge Rd Looking East

SR 3527 – Bradley Branch Rd Looking North

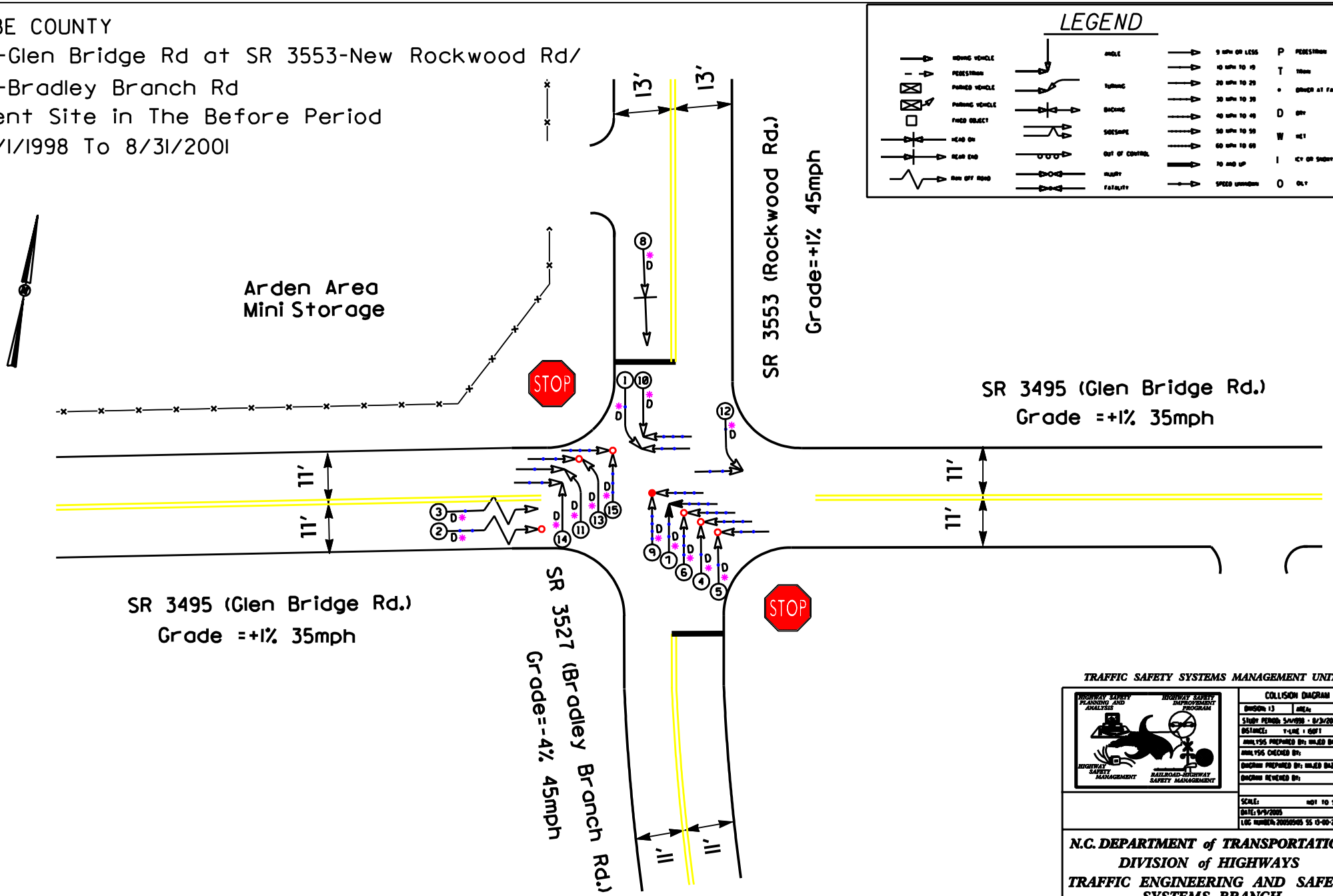
SR 3553 – New Rockwood Rd Looking South

SR 3495 – Glen Bridge Rd Looking West

Sight Distance

Sight Distance

BUNCOMBE COUNTY
SR 3495-Glen Bridge Rd at SR 3553-New Rockwood Rd/
SR 3527-Bradley Branch Rd
Treatment Site in The Before Period
From 5/1/1998 To 8/31/2001



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

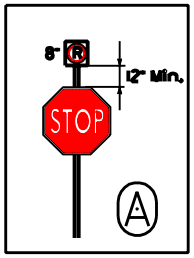
COLLISION DIAGRAM

SCALE: NOT TO SCALE

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH

before.dgn 11/15/2005 12:43:34 PM

BUNCOMBE COUNTY
SR 3495-Glen Bridge Rd at SR 3553-New Rockwood Rd/
SR 3527-Bradley Branch Rd
Treatment Site in The After Period
From 12/1/2001 To 3/31/2005



Arden Area
Mini Storage

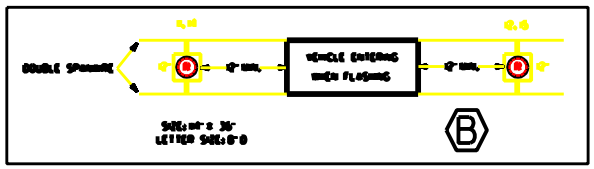
SR 3553 (Rockwood Rd.)
Grade=+1% 45mph

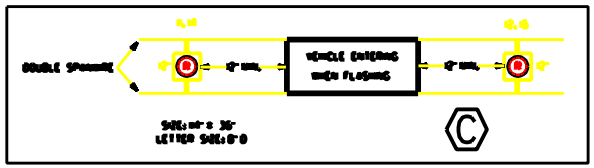
SR 3495 (Glen Bridge Rd.)
Grade =+1% 35mph

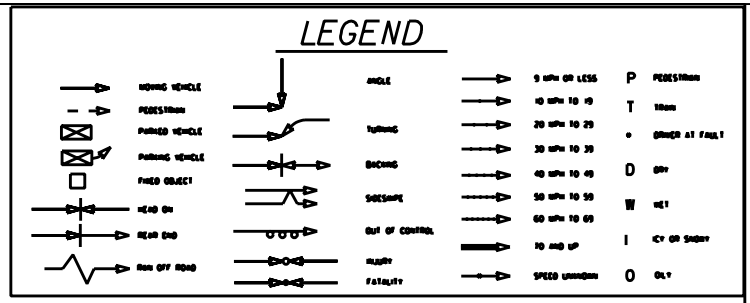
SR 3495 (Glen Bridge Rd.)
Grade =+1% 35mph

SR 3527 (Bradley Branch Rd.)
Grade=-4% 45mph

13'
13'
11'
11'
11'
11'
11'
11'







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